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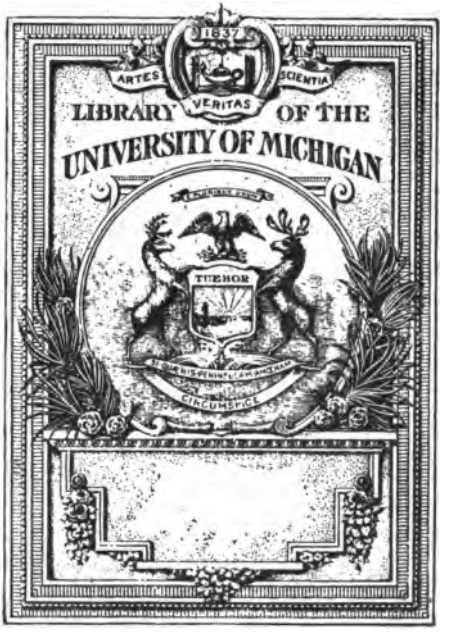
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REPORT

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OF

THE COMMISSION

APPOINTED UNDER THE

PROVISIONS OF ACT OF CONGRESS OF MARCH 3, 1877,

REGARDING THE

HOT SPRINGS RESERVATION

IN THE

STATE OF ARKANSAS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1877.

REPORT

OF THE

HOT SPRINGS COMMISSION.

OFFICE OF THE UNITED STATES HOT SPRINGS COMMISSION,
Hot Springs, Ark., November, 1877.

SIR: The commissioners appointed under an act of Congress approved March 3, 1877, entitled "An act in relation to the Hot Springs reservation in the State of Arkansas," have the honor to respectfully submit the following report and recommendations in respect to the work committed to their charge.

In April last they received their appointment from the President, and were duly qualified, and on the 28th of the same month they met at Hot Springs, Ark., and organized by the election of Hon. Aaron H. Cragin chairman of the board, having first given ten days' notice in both daily papers published at Hot Springs. This notice is continued, as required by law, during the session of the commission.

Mr. John W. Anderson was then appointed as stenographer and clerk, and F. A. Clark was chosen to take charge of the surveying and engineering. Both of these gentlemen have proved themselves efficient in their respective departments, and the commissioners desire to make this acknowledgment of their faithful and valuable services.

An examination of the complicated nature of the claims to be adjudicated and the rugged and mountainous character of the country to be laid off into city lots, blocks, and squares, with the necessary avenues, streets, and alleys, soon convinced the commissioners of the magnitude and importance of their labors.

The work to be done had a national importance, inasmuch as the government had determined to retain control of all medicinal waters here for the benefit of the general public, and had directed that all the thermal springs should be reserved from sale, together with a considerable portion of the original reservation, to be placed under the charge of a government officer appointed by the Secretary of the Interior for the purpose.

It was evident that the public benefit to be derived from the interest thus retained by the government and the value of the remainder of the reservation to be sold to private parties would depend largely upon the thoroughness and scientific skill with which the work was done.

With these facts in view the engineer was authorized to employ such assistants and force as he might deem necessary to make a thorough topographical survey of the entire reservation, as well as the exterior and subdivision lines.

This work has been pushed forward nearly to completion, and would have been completed some time ago had the surveyors not been called

off in the mean time for other necessary work, such as laying off the Hot Springs Mountain reservation, and locating individual claims and improvements on the general reservation. The accompanying report (marked "A") of the engineer furnishes the particulars of the work performed and cost incurred in this branch of the service.

Under the provisions of the law claimants were allowed six months from the date of the organization of the commission in which to file their claims, and, contrary to expectation, a majority of the claimants failed to file their claims until the last month allowed.

Rules and regulations for filing claims having been prescribed by the commissioners, their office was kept open from day to day, for the purpose of receiving and filing the same, until twelve o'clock on the night of the 27th day of October, 1877, the time limited by law in which claims were to be filed "or to be forever barred."

Notwithstanding the liberal time allowed, some claimants failed to file their claims, but these were few and unimportant.

During the six months 950 claims were filed, in the form of petitions, setting forth the grounds on which each claim is based. These petitions have been numbered in the order of filing, and the date of filing indorsed thereon; also entered in a docket-book kept for that purpose.

The commissioners have heard the testimony offered by claimants in support of their petitions in 260 cases, and have examined 756 witnesses. This testimony has been taken in short-hand and a considerable portion transcribed.

The commissioners have laid off and caused to be surveyed and designated by metes and bounds a tract of land which embraces in one boundary all the hot or warm springs, and as near as may be what is known as "Hot Springs Mountain," which tract, under the law, is reserved from sale.

The boundary-line follows the base of the mountain, except at the north end where the mountain extends outside the general reservation, and embraces an area of 265 acres, nearly. It was laid off with a view to the practicability of making a public street all the way around on the outside, which will serve as a carriage-drive, and some protection against boring for hot water. Such road will pass completely over the mountain at the north end, and thus make accessible to invalids a mountain view which fairly rivals in beauty and grandeur the White Mountains of New England.

This reservation was reported to and approved by the Secretary of the Interior in June last.

While the commissioners embraced in this reservation all the territory they felt authorized to under the terms of the law, yet they are of the opinion, from the nature and character of the country and the great value and importance of this place as a health-resort, that a much larger tract should be reserved from sale.

The thermal springs all make their appearance on the west side and at the base of the "East" or "Hot Springs" Mountain.

Immediately west another mountain rises and continues in a southwesterly direction across the west line of the general reservation near the southwest corner. This is "West" or "Whip-poor-will" Mountain, and its area is about 500 acres. It is unavailable for building-lots, but is covered with a heavy growth of trees, the foliage of which is dense and beautiful.

At the head or north end of Valley street is still another mountain, called the "North" or "Novaculite" Mountain. This is separated from Hot Springs Mountain by a narrow gulch extending for some distance

toward the northeast corner of the general reservation, where both come together as one. It is also unavailable for building-lots, and has an area of about 200 acres; but, like the other two mountains, it is heavily wooded.

The three mountains constitute a range traversing diagonally the entire reservation, the trend being from northeast to southwest.

The range is bisected by the gorge in which the thermal springs issue, and through which flows a lively stream.

This gorge affords the only thoroughfare through the mountains and connects the table-lands in the southeast and northwest, which lands may be laid off into lots and sold, affording ample space for the town.

If the mountain-lands pass into the hands of private parties, it is more than probable that they would be stripped of their timber for fuel purposes and rendered unsightly. Moreover, they would then be exposed to the full force of the sun's rays, absorbing the heat during the day, to be poured into the valley at night, instead of the cool refreshing breezes which now regularly descend from their shady heights to displace the impure air below. Thus it is plain that their foliage si of incalculable value to this place designed as a national sanitarium.

With these views the commissioners submit the proposition of reserving from sale the entire mountain range, and recommend the necessary legislation by Congress.

The immense work incident to arranging and preparing the cases for adjudication and keeping up the records, in accordance with the requirements of the law, rendered it necessary to employ two additional clerks, one recording and disbursing clerk and one transcribing clerk.

Another stenographer and transcriber are very much needed to facilitate the work, and would be economy to the government in the end. It is impossible for one stenographer to report and translate the testimony as fast as the commissioners can take it.

There remain 700 claims in which testimony is to be taken, which, by estimate, will involve the examination of 3,000 witnesses.

The cases in which testimony has already been taken are mostly uncontested. In many of those to be examined hereafter are conflicting claimants, and several of them will occupy the commission from one to two weeks each in taking the testimony.

A few instances have been brought to our attention in which the substantial facts set forth in the petitions of the claimants cannot be established by proof that can be obtained at or near Hot Springs.

The law is ambiguous and seems to contemplate the taking of all proof by the commission at Hot Springs.

They beg leave to suggest an amendment of the act, giving power to the commissioners to authorize the taking of depositions in cases where the witness may reside out of the State of Arkansas, and cannot attend the sessions of the commission.

The law provides for the appraisement of condemned buildings, the issuing to the owners certificates of their value, and their removal by order of the commissioners, but provides no place to which they may be removed, and no fund to meet the expenses of their removal.

The commissioners suggest that power be given them to sell the condemned buildings and structures at public auction after having given reasonable notice, unless the owners shall prefer to remove the same, at their own expense, rather than take the certificate of their value.

The people of the county are poor, the soil is unproductive, and no surplus is obtained by the severest labor. The bulk of the population is in this town and will be in the future. The amount to be obtained

from taxation for school purposes must inevitably be small and totally inadequate to the building and support of good common schools.

The commissioners therefore suggest that they be empowered to dedicate four lots, not adjudicated to any claimant, to the use of common schools for the erection of school-houses thereon.

The act of Congress defining the powers and duties of the commissioners provides "that said commissioners shall hold their offices for the period of one year from the date of appointment."

As heretofore stated, the commissioners were appointed on or about the 1st day of April, 1877, consequently the "one year" specified in said act will expire on the 1st day of April next.

It is already apparent that the duties imposed upon the commissioners by said act cannot be completed by that time. In the first place, the magnitude of the work to be performed in the full and thorough discharge of the duties imposed by said act is more than double what was anticipated when the commissioners entered upon the same; and, second, the commissioners did not anticipate such delay in filing claims as occurred. The law gave the claimants six months from the first meeting of the commissioners in which to file their claims, and no one had a right to complain that so many availed themselves of the full time.

As before stated, more than one-half in number delayed in filing their claims till within the last month allowed by law, and among this number were all those claiming large tracts of land, and conflicting with and overlapping numerous small claims. The commissioners started out early to take the testimony in claims first filed, and which it was supposed would not be contested by other claimants.

The sequel has proved that much labor in that direction was lost, for at a later day other parties filed claims for the whole or a part of the same land, and the testimony must be taken over again. If, therefore, the work which has been commenced, and in which great progress has been made, is to be finished, and well and creditably finished, the time must be extended for its completion.

The commissioners hope it will not be inappropriate for them to say that they are not anxious for any reason to prolong the time beyond what is absolutely necessary for a just and satisfactory performance of their duties, especially as they regard their compensation as inadequate.

The accompanying statement of the disbursing agent (marked "B") shows the amount of disbursements to the 24th instant, and the balance on hand available for this work on that date.

A table of estimates (marked "C") accompanying this report has been prepared, covering the deficit of the present fiscal year, and also the fiscal year ending June 30, 1879, and it is confidently believed the work can be completed within that time.

The appropriation already made is to be refunded to the Treasury from the proceeds of the sales of lands here. Without attempting to say what amount will be realized to the Treasury from such sales, it is safe to state that the amount will largely exceed all appropriations necessary to complete the work and to pay all certificates given for condemned property.

HISTORY OF THE RESERVATION.

By act of April 20, 1832, Congress reserved from entry, location, or sale "the Hot Springs, together with four sections of land, including said springs as near the center thereof as may be." At that time the public surveys were not completed in this State (then the Territory of Arkansas), and were not made at this point for some six or seven years

thereafter. By this time the value of these springs had become known, and as soon as the public surveys were completed several settlers attempted to enter these lands, claiming that they had acquired pre-emption rights prior to the act of Congress reserving them. All were eager to secure the prize, and contention became fierce. This led to vexatious litigation among the settlers, which was carried on with varying results for over thirty years. In order to settle the controversy and quiet the title, Congress authorized, by act of June 11, 1870, "any person claiming title, either legal or equitable," to the Hot Springs of Arkansas, to institute in the Court of Claims "any suit that may be necessary to settle the same."

Under this authorization the claimants instituted suits, which were decided adversely to them and in favor of the government. An appeal was taken to the Supreme Court of the United States, which, on April 24, 1876, confirmed the judgment of the Court of Claims. A receiver was then appointed by the court to take charge of the property and collect rent. The large amount collected and turned over to the government (about fifty thousand dollars) during the few months he was in charge of the property, shows the financial importance of these springs.

Meanwhile a town has sprung up of about four thousand resident, and a large transient, population. Thus the government found itself the possessor and legal proprietor of this valuable tract of land, with a considerable city already built upon it. This was an unprecedented condition of things in the history of our government, and some plan had to be adopted for the proper disposition of it. Hence the act of Congress of March 3, 1877, by which the receiver was discharged and this commission created.

Under this act the government has wisely reserved the thermal springs for the public benefit, thus preventing the possibility of their ever passing under the control of a heartless monopoly, but has provided for the sale, by town lots, of the remaining territory. Settlers who made their improvements prior to April 24, 1876, are secured in the possession of the same, as far as practicable, by being granted a preferred right of entry for twelve months, at the appraised value, of any lot or lots improved by them. Under this provision many lots are contested by two or more claimants. To adjudicate the right of purchase between contending parties, to determine the extent of the improvements, and to fix the value of the lots impose upon the commission a peculiarly onerous and delicate responsibility.

It is of the greatest importance that the work of settlement should be completed at as early a date as practicable; but where there are so many parties in interest contesting, much delay will necessarily be experienced. As long as disputes exist and titles remain unsettled, the growth of Hot Springs will be retarded, the character of building will be temporary, and the accommodation for visitors, upon whom depends its chief support, will be limited. There are, however, about twenty hotels, of all classes, numerous boarding-houses, and eight bath-houses, including two connected with hotels, having an aggregate of one hundred and fifty tubs.

Nature has done her part toward making this place a beautiful rendezvous for those seeking health or pleasure. It is peculiarly adapted for a national resort for the afflicted. It is easy of access, and located near the geographical center of the nation, and possesses a mild and equable climate. Want of official data makes it impossible to state the mean temperature; but from records kept at this office since the 1st of July last, it appears that the mean maximum temperature during July

was 87°.9; August, 91°.1; September, 81°.6; October, 70°.7; and for the four months, 82°.8. The highest reading of the thermometer during that time was 102°, on August 31.

In closing this report, the commissioners make use of the following extract from a report to the American Medical Association by Dr. George W. Lawrence, a long-resident and experienced physician of this place:

The Hot Springs of Arkansas are among the wonders of the continent. They are situated about sixty miles southwest from Little Rock, and twenty-five miles by rail from Malvern Station, on the Saint Louis, Iron Mountain and Southern Railway. These springs, fifty-seven in number, ranging in temperature from 93° to 157° Fahr., discharge over 500,000 gallons of water daily, sufficient in quantity to accommodate, with delightful bathing, 10,000 bathers every day in the year.

These natural earth-heated waters hold in solution valuable mineral constituents. Clear, tasteless, inodorous, these springs pour forth, from the Novaculite ridge, waters as pure, bright, and sparkling as the pellucid Neva. The various springs are qualitatively allied, not holding in solution or freighted with too much abusive mineral, and they are free from all noxious gases. It is believed the properties of the waters, especially in the treatment of chronic hæmic diseases, are unequaled. There are no springs known of superior value, or that can compare with the Hot Springs of Arkansas as adjuncts in the treatment of that class of chronic diseases. They are more nearly allied to Gastein, in the Noric Alps, than any known springs; but, in regard to climatic advantages, we can justly claim that the climate of Arkansas throughout the year far surpasses the European.

When hydrotherapy is more generally understood by the medical profession at large, these natural waters, as remedial adjuncts, will surely be more appreciated for the virtues they possess. These thermal springs do not belong to that class known as intermittent waters. They flow a constant, regular current, with like temperature. Arising from great depth, the calidity or gelidness, exteriorly, does not appear to influence them.

Many theories exist regarding the cause of heat of all such constant springs. We must incline to the views of Humboldt, that it is imparted by the inherent heat of the earth. These superheated waters and gases, with the high electrical condition (as we find, artificially or naturally generated whenever the temperature is elevated to a certain altitude above ebullition), hold in solution the soluble mineral tissues of the earth, through which the hot water penetrates, and convey it to the surface.

The crude materials found by qualitative analysis in these waters are: Silicates, with base; bicarbonate of lime; bicarbonate of magnesia; carbonate of soda; carbonate of potassa; carbonate of lithia; sulphate of magnesia; chloride of magnesia; alumina, with oxide of iron; oxide of manganese; sulphate of lime; arsenite of lime; arsenite of iron; bromine; iodine, a trace; organic matter, a trace.

The pure, subtle liquid certainly holds in refinement active mineral ingredients that no chemical analysis can resolve satisfactorily its true natural combinations or reveal the relations.

The inherent thermo-electric properties, together with the peculiar chemical formations of the carbonates of the alkalies, alkaline earths, and other mineral substances, give the waters properties that cannot be imitated by art. Their action is strangely unlike artificially-prepared waters. Who would sip, gulp, or quaff down three or four pints of artificially-prepared water, at a temperature of 148° or 150° Fahr., at one time, and feel refreshed after the feat? Here it is given to invalids as the usual dose during the process of bathing.

The efficacy of this wonderful fluid, medicated mysteriously in subterranean recesses, by its affinities or powerful combining forces, is really a subject worthy of more general study and of true professional interest. As correllants, alterants, and eliminants, these waters are important adjuncts that will aid the practitioner with celerity to control many obstinate chronic ills.

Now that the Hot Springs Railroad is completed, affording greater facilities for travel, this miniature Baden Baden will be an invalids' resort throughout the year. We predict that the period is not remote when these springs will be more famous, and resorted to annually by European tourists for all chronic hæmic diseases. The advantages of the climate throughout the year, the pure, rarefied mountain air, the delightful waters, all give promise that these springs will soon be one of the most celebrated resorts for invalids in the United States.

Careful study and observation of the effects of the springs, the source and quantity of the flow, the properties and curative qualities of the

hot waters, demonstrate that they possess wonderful remedial virtues, and are capable of being made the most important water cure in the world.

Very respectfully, your obedient servants,

AARON H. CRAGIN,
JOHN COBURN,
M. L. STEARNS,
Commissioners.

Hon. CARL SCHURZ,
Secretary of the Interior, Washington, D. C.

A.

ENGINEER'S OFFICE OF THE UNITED STATES HOT SPRINGS COMMISSION,
Hot Springs, Ark., November 24, 1877.

To the honorable Commissioners in relation to the Hot Springs of Arkansas:

GENTLEMEN: I have the honor to present the following report in relation to the Hot Springs reservation. The New Madrid certificate No. 467, issued to Francis Langlois, was located so as to include the "main Hot Spring of Arkansas, so near as may be in the center thereof," as well as all the hot waters of this locality. The survey for this location was made in 1819, but as the claim has been decided to be invalid, no regard has been, nor can be, given in the present work to the lines of said claim.

In 1832 an act of Congress reserved from sale or entry the "Hot Springs [of Arkansas] together with four sections of land, including said springs as near the center thereof as may be."

The United States land-surveys of townships over this locality were made in 1822, 1837, and 1838, and the subdivisions into sections were made in 1838 and 1840; by these surveys the reservation made by above act of Congress lies in two townships; including two whole sections and two half sections in one township, and two half sections in another township, to wit: "The south half of section 28, the south half of section 29, all of sections 32 and 33, in township 2 south, and range 19 west; and the north half of section 4 and the north half of section 5, in township 3 south, and range 19 west.' The tracts reserved were all made to appear on plat of township 2 south, range 19 west, the approval of which by the surveyor-general of the United States on the 30th of April, 1838, was the final official designation of this reservation. By act of Congress approved March 3, 1877, provision was made for the transfer of these lands from the general government, through a board of commissioners, to the public, preference being given to settlers.

Recognizing the value to the country at large of these medicinal hot waters, and the necessity of providing not only for the accommodation but also for the pleasure and comfort of those seeking benefit therefrom, it is provided in this bill that the hot waters shall be reserved by the United States; it is also provided that giving such deference to the improvement made by the four thousand people now occupying these lands, "as the convenience of the public and the interest of the United States may require," your honorable board be authorized "to straighten or widen any of the present streets, alleys, and roads," to lay out such convenient squares, blocks, lots, avenues, streets, and alleys as may be consistent with the interests of the United States; and to employ competent engineers to make such surveys as the performance of these requirements renders necessary.

An examination of the accompanying topographical map, compiled and reduced from the map made by Capt. E. A. Douglass, shows a transverse mountain ridge extending across the reservation from southwest to northeast, with a heavy spur from the northeast; this latter known as the Hot Springs Mountain. A branch of this ridge makes a grand loup from the southwest around to the northwest, and, with a low depression across the middle north line of the reservation, connects with the transverse ridge. The basin thus formed is drained by a creek from the west and another from the north, which unite a short distance above the center of the reservation, and, cutting through the main ridge, making a shallow cañon, receives the water of the Hot Springs, which lie at the base of the Hot Springs Mountain, and continuing with a general southerly course, at six miles distant flows into the Ouachita River. These ridges, together with the heavy spur, cover about three-fifths of the whole area. They are quite uniform in their general character and elevation, being some 500 feet above the lowest point of the reservation, which is where the Hot Springs Railroad enters the same. They have

but slight breaks from regular slopes, and a cross-section of either would give a paraqolic curve.

From the northwest mountain are long, low, rolling spurs, with slight elevations or knolls; but none with such abrupt slopes as have the mountains proper. At the foot of these spurs, between them and shorter though like spurs from the main ridge, lies the valley section, with average width of 300 feet, through which run the two forks of Hot Springs Creek. To the south and east of the main ridge is a rolling, but by no means a prairie country, having a range of 100 feet in level, and being about one-quarter of the entire area. This section is that which is the most generally built over. A heavy growth of hard and soft woods, pines and hickories, gums and oaks, standing side by side, covers the mountains and spur-slopes, as well as much of the rolling ground. And yet the rock, principally sandstone, of which these mountains are almost wholly composed, is covered with so thin a soil that a heavy rain-fall runs as from a roof, and, in a very short time, causes the creek to assume the character of a freshet. There are some dozen cold springs; otherwise water is readily obtained by sinking wells of shallow depth.

Under your instructions that the engineering work should be done in a thorough and complete manner, commensurate with the importance of a sanitarium, and that it should progress as rapidly as possible, three parties were organized:

The first, under Capt. E. A. Douglass, an able and careful engineer and topographer, to make the survey of the Hot Springs and Hot Springs Mountain, in accordance with section 4 of the act creating this commission;

The second, under Maj. William R. De Voe, an experienced land-surveyor and city engineer, to retrace and define the exterior boundaries of the reservation; and

The third, under James W. Brown, esq., an experienced city surveyor, to survey the lots claimed by settlers upon the reservation.

These parties were disbanded upon completion of the work for which they were formed. Later another party was organized under Col. Samuel Hamblin for obtaining the topography, and is still in the field.

The natural obstacles to be overcome, a rough and rocky country, heavy forest-growth, and almost total obliteration of authoritative landmarks, render the more creditable to these gentlemen the skillful manner in which they performed their respective labors.

Simultaneously with the field-work, draughting of same was going on. At first this was in charge of Mr. E. H. Johnson; upon his retiring it was performed by Mr. S. W. Tullock, and upon his acceptance of a professorship, Mr. W. G. Walbridge, civil engineer, succeeded; and through his energy am I enabled to furnish the inclosed maps and plats, reduced from those on file in this office.

The survey for the boundary-line of the Hot Springs Mountain reservation was begun May 21, the principles adopted being extreme accuracy of angle and measurement, and as to location, selection of line with such gradients as to make possible a carriage-drive about its exterior. Hot Springs Mountain and all the known warm springs, numbering seventy-one, of temperature from 68° to 157° (see inclosed list), are included in this tract, its area being 264.93 acres; number of courses, forty-seven—shortest, 99.4 feet; the longest, 914.2 feet, and the total length of boundary 15,863.9 feet, giving an average course of 337.5 feet. Computation of the field-work gave a plus error of 5.15 feet in latitudes, and plus 2.45 feet in departures. The survey, as thus designated by you, was accepted and approved by the honorable the Secretary of the Interior on June 8, 1877. (For plat of the reservation see topographical map.)

A certified transcript of the field-notes of land-surveys of the sections in which was located the reservation was obtained from the auditor of the State of Arkansas. These surveys, having been made in 1837 and 1838, made it a very difficult and delicate task to retrace the lines as first run, but by blocking out trees, the markings often overgrown four or five inches, every witness-tree, now standing, was developed, and the boundary-line has been as accurately determined in its metes and bounds as the possible question of title seemed to demand. Monuments, appropriately lettered, have been set at each section and quarter-section corner about the exterior boundary. (See line map.) The claims or lots included within these lines have been surveyed to the number of eight hundred and thirteen, and areas of same computed. (See claim map.) The system of grand squares was adopted for subdivisions, and after the exterior lines were defined was carried into effect, producing sixteen approximate squares; the same being designated by capital letters, A to R. Six of these squares, through the center of the reservation north and south, including the most valuable territory, are equilateral and equiangular; the remainder as nearly so as irregular general boundary permits, all excess or deficit being thrown into exterior squares, as shown on line map. The transit and Chesterman steel tape have been used in all of this triangulation and measurement.

Additional to base-lines, obtained by subdivisions, there have been run some five miles of base-lines through the principal streets and the group of hot springs. The topography has been thoroughly carried over four-fifths of the reservation, upon plan

of 10 feet contour, with primes over the most valuable ground. This, with transit and level, upon system of squares and meanders therefrom. (See line map.)

The reservation may be described as one-half mountain country, one-quarter spur-slopes, and one-quarter comparative rolling ground.

The field-work has necessitated the running of over 225 miles of line, in addition to which were the meander-lines required in securing the topography.

A summary of the field-work gives the following result:

1. Survey of the Hot Springs Mountain reservation;
2. Determination of exterior lines of reservation;
3. General subdivision lines;
4. Survey of claims;
5. Running street base-lines; and
6. Topography.

The office-work accomplished is—

(*a*) Platting of the Hot Springs Mountain reservation;

(*b*) Platting of claim-surveys on scale of 100 feet to 1 inch; giving metes, bounds, and name of claimant, together with houses and index number; one grand square to each sheet;

(*c*) Platting of compiled map of claim-surveys on scale 200 feet to 1 inch (a reduction of which is inclosed); and

(*d*) Platting of topography has been commenced.

A detailed statement of expenditures is impracticable, from the fact that many of the accounts were charged in the general office expenses, instead of to specific purpose, but to November 1 the account may be rendered as follows:

Pay-roll of employés	$7,871
Incidentals, including office and field material	724
Total	8,595

There remains yet to be done: completion of the topography, and platting of the same; a thorough and careful study thereof, and determination of routes for avenues and streets consequent thereon; devisement of a lot system, and thereafter a laying down of the entire design upon the ground. The doing of this latter will be more expensive than is ordinarily incurred in town-surveying, both in that it will require skilled surveyors and also take more time. This arises from the fact that the varied character of the country will necessitate the adoption of a street-plan in which straight lines will be the exception and curves the rule.

The cost of the greater part of this further work depends so much upon the detail of the plan adopted for street and lot systems, that estimates for its performance may be only approximated. To complete the work in a thorough manner, I estimate as follows:

Draughting and office-work	$4,500
Office-material and incidental expenses	2,000
Laying out streets and lots, including labor, monuments, stakes, and all field-material	10,500
Total	17,000

There are here three classes of country, to wit:

1. Valleys and spur-slopes;
2. Rolling ground; and
3. Mountains.

The topography of each should be carefully questioned, as for what class of private or public undertakings it is comparatively suitable, and each should be laid out with view to the development of the utilities for which it is specially fitted by natural circumstances. Studied thus, it is evident that nature has peculiarly adapted each class for the following purposes:

1. Valleys and spur-slopes for a system of villa lots.

2. Rolling ground for commercial purposes, and residences of those required to live in immediate neighborhood of their business. The more important portion of this section of the country will have ready access to the Hot Springs Railroad, it having right of way to the Malvern road.

3. Mountains, especially favorable for drives and health resorts, being neither practicable for residence nor commerce. Upon the mountain-proper, it is desirable that the forest growth should be preserved. This is almost a necessity, and appeals both to the heart and head, in that it is an important element of health, and in that it is a great addition to the beauty of the landscape. Remove the trees, and barren, bleak, and rocky slopes would meet the eye at every point of the compass; preserve them rigidly, and under proper management they may be made one of the most attractive features of this locality. This may be done either by the mountains being reserved from sale and continued under the control of government, or it might be done if they were

sold to liberal and intelligent capital, which would realize the necessity and have the means to carry out the plans which might be made for their development.

The drainage question is one of the most important subjects which is here to be considered, both as a required provision to the needs of a community, and also in its sanitary bearings. A method for its solution should be adopted ere the new plans are matured, as it will greatly affect the street system. The Hot Springs Creek is the natural drain of nine-tenths of this reservation, and 800 feet of its course is through the permanent reservation. The manner of dealing with this subject should be uniform throughout the whole length of the creek, which is now the receptacle of all the refuse and filth of nearly the entire reservation, as it is also the only water-supply of many living near it. To cover it would be very costly as well as least healthy; to sink a sewer-pipe in bed of the creek and make an open water-way with sodded slopes high enough to carry any probable freshet, having on either bank a shady promenade, would cause it to subserve to the æsthetic and be the most economical treatment of the question.

In any case, the putting of the creek into proper condition for meeting sanitary and recreative requirements, would be beyond the means of the community, and it would seem appropriate that for this matter, as well as for other of the more expensive work which must be done here, the general government should grant a portion of the sum derived from sale of these lands. Further than this, it would be desirable that such construction should be performed under the management or direction of those designing the same, in order to secure their execution with the efficiency that is contemplated, as not only allowable but essential to the full enjoyment of and benefit from the Hot Springs of Arkansas.

Respectfully submitted by your obedient servant,

FRED. A. CLARK,
Engineer.

Table of Springs upon the Hot Springs Mountain Reservation.

Number.	Temperature.	Elevation + feet.	Character.	Remarks.
1	77°	91.4	Constant flow.	*Datum of levels.*—The lowest point on the Hot Springs reservation, being on the east side where the Hot Springs Railroad enters the same, approximates 500′ above tide-water of Gulf.
2	76	98.7	....do	
3	124	98	....do	
4	124	98.3	....do	
5	80	115.6	....do	
6	103	171.6	....do	
7	115	172.2	....do	
8	121.5	177.5	....do	
9	122	179.6	....do	
10	121.5	181.2	....do	
11	105	120	....do	
12	111	117.5	....do	
13	135.5	85.2	....do	
14	137	84.3	....do	
15	134	84.7	....do	
16	101	135.8	....do	
17	.....	140	seapaga	
18	93	158.3	constant.....	
19	84	159.3	....do	
20	83	162.8	....do	
21	106	107	....do	
22	122	118.2	....do	
23	125	123.8	....do	
24	113	127.7	....do	
25	111	127.7	....do	

Table of springs upon the Hot Springs Mountain reservation.—Continued.

Number.	Temperature.	Elevation + feet.	Character.	Remarks.
	°			
26	106	127.9	Constant flow..	
27	127.5	130.3	....do	
28	145	129.4	....do	
29	90	140.4	....do	
30	134.5	148.3	....do	
31	147	133.2	....do	
32	124	95.7	....do	
33	140	89.8	....do	
34	120	91.8	....do	
35	135	91.8	....do	
36	110	90.4	....do	
37	120	155.5	....do	
38	128	90.2	....do	
39	125.5	92.2	....do	
40	112	92.3	....do	
41	155	113.5	....do	
42	.....	110.2	....do	Under B. I. B. House.
43	144	164.4	....do	
44	.....	162.8	....do	Under B. I. B. House.
45	111	171.8	....do	
46	.....	109.8	....do	Under bath-house on hill.
47	144.5	176.5	....do	
48	91	178.9	....do	
49	131	176.1	....do	
50	145	179.6	....do	
51	144	182.8	....do	
52	143	178.3	....do	
53	144.5	186.1	....do	
54	146	186.1	....do	
55	122	92.7	....do	
56	133	95.3	....do	
57	128	100.2	....do	
58	.....	101.9	....do	Inaccessible, near Arsenic Spring.
59	133	102	....do	
60	134.5	112.9	....do	
61	133	186.1	....do	
62	109	186.3	....do	
63	83	186.2	....do	
64	135	186.6	....do	
65	141	186.1	....do	
66	87	185.3	....do	
67	.....	113	intermittent...	In Arlington yard. Flows after heavy rain; 134°.
68	131	85	constant	
69	83	89.7	....do	
70	89	89.4	....do	
71	94	89.3	....do	

Giving summary as follows:

Number of springs	71
Range of temperature	79°
Lowest temperature	76°
Highest temperature	157°
Range of elevation	102'.3
Lowest elevation	84'.3
Highest elevation	186'.6